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Fimbriaria sarcinalis sp. n. (Cestoda, Hymenolepididae) – a New Parasite of *Aythya fuligula* L. and *Aythya nyroca* Güld. in Poland

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Abstract. A new cestode species from the genus *Fimbriaria* Froelich, 1802 is described. The parasites were found in the duodenum of *Aythya fuligula* L. and *A. nyroca* Güld. Described here new species differs from those previously recorded mainly by the mode of egg evacuation from gravid strobila: the *Fimbriaria sarcinalis* eggs leave the uterus in large irregular packets.
Negative results of experimental infection of *Acanthocyclops viridis* and *Macrocyclops albidus* (Copepoda) considered as potential intermediate hosts of this new species of cestode are also described and discussed.

Key words: *Fimbriaria sarcinalis* sp. n., Cestoda, Hymenolepididae, parasite, *Aythya fuligula* L. and *A. nyroca* Güld., Poland

INTRODUCTION

Among hymenolepidid tapeworms parasitizing waterfowl (which belong mainly to Anseriformes) the three species from of the genus *Fimbriaria* were formerly described: *Fimbriaria fasciolaris* (Pallas, 1781), well known from different world regions, with the exception of Antarctic, *F. amurensis* Kotelnikov, 1960 from Amur river region (Russia), and *F. kubanica* Kotelnikov, 1965 from the North Caucasus and Ukraine. In spite of frequent occurrence of the above mentioned cestodes, clear picture of their morphology is difficult to obtain because of lack of proglotisation and evident compression of internal organs.

MATERIAL AND METHODS

The description of new *Fimbriaria* species is based on three gravid specimens without scolices which were stained with lactocarmin before fixation. All specimens were obtained from naturally infected ducks *Aythya fuligula*. Eggs of the cestode were also examined in fresh alive state. All mean values presented here in brackets were taken out of 50 measurements.

The experimental infection of potential intermediate host was undertaken three times: about 200 specimens representing

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two species – *Acanthocyclops viridis* and *Macrocyclops albidus* – were exposed to the oncospheres (ad libitum) for a period of 24 hr. Then, the copepods were transferred to culture vessels, and, in regular one weak intervals examined during next four weeks.

DESCRIPTION

Fimbriaria sarcinalis sp. n.

Host: 5 specimens *Aythya fuligula* L. and 2 specimens *A. nyroca* Güld (Anseriformes);

Locality: lake Guber (Mazurian Lake District); Górki Wschodnie near Gdańsk, Baltic sea side; fish ponds in Żabieniec, environments of Warsaw, Poland;

Location: duodenum;

Intensity: 1–3;

Syntypes in the Department of General Biology and Parasitology, Warsaw, Chałubińskiego 5;

Life cycle: unknown, experimental infestations of copepods were undertaken 3 times with negative results.

Morphology of *Fimbriaria sarcinalis* sp. n.

Strobila of gravid specimens with oncospheres is 120–150 mm long and 3 mm wide (after fixation). Scolex – unknown, was absent in the examined specimens. Pseudoscolex – well developed, up to 8 mm in length and up to 1.8 mm wide, without genital primordia, composed of about 300 short, regular proglotids. Excretory canals in number of 6 are visible already in the pseudoscolex.

Behind the pseudoscolex regular segmentation is no longer visible (Fig. 1). There segments appear representing complexes of several proglotids

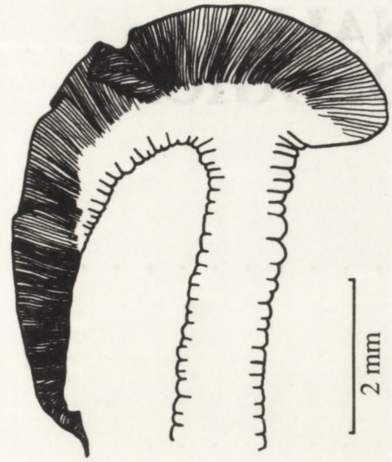


Fig. 1. Proglottids of pseudoscolex of *Fimbriaria sarcinalis* and external segmentation of strobila.

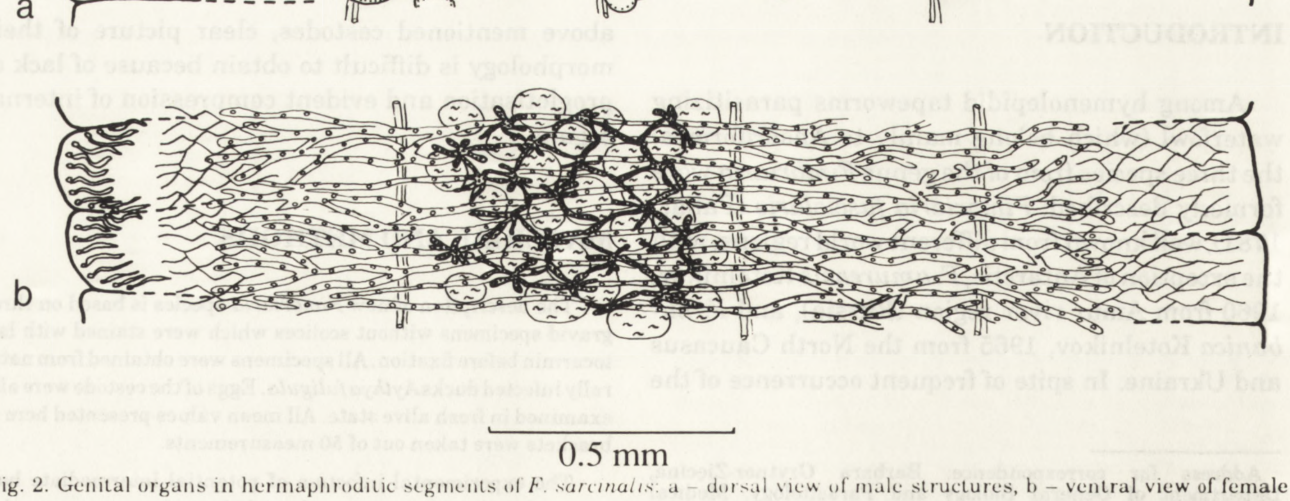


Fig. 2. Genital organs in hermaphroditic segments of *F. sarcinalis*: a – dorsal view of male structures, b – ventral view of female structures.

marked only by external infoldings of the strobilar surface. The primordia of the genital system appear in a distance of about 5.5 mm behind the pseudoscolex. The number of cirrus pouches correspond to the number of reproductive organs per segment and is more or less constant; it varies between 9 and 15 (mean number 12.3) in the mature part of strobila. The immature segments are two to four times longer and they contain between 51–60 genital primordia.

Male genital system (Fig. 2a). The number of testes per segment varies between 27 and 45 and, therefore, there are 3 testes per one cirrus pouch, which indicates one set of male genital organs. The testes have smooth surface and are vesicular, slightly elongated towards vasa efferentia. External seminal vesicle is also elongated. Cirrus pouch 120–150 µm (mean 135 µm) in length and 9–14 µm in diameter is straight or irregularly curved. Small cirrus is armed with hooked spines of different length: the largest in the number of 8–10 are situated at the cirrus base. On the dorsal side the spines are longer than on the ventral side (Fig. 3).

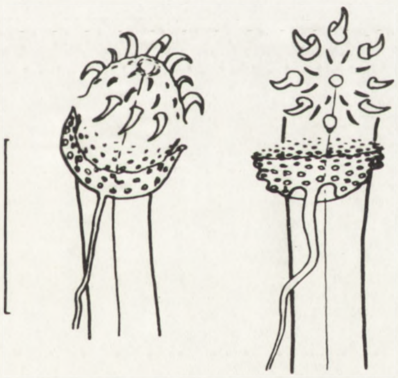


Fig. 3. Cirrus and vagina of *F. sarcinalis*.

Female genital system (Fig. 2b). The primordia of the female genital system appear in a distance of about 12.5 mm behind the pseudoscolex and they occupy the middle part of each segment between the poral and medial excretory canals. The number of the female genital primordia per segment is equal to cirrus pouch numbers. The copulatory part of the vagina enlarges into funnel and shows characteristic structures on its surface. The middle part of the vagina have very thin wall. Receptaculum seminis initially small and empty fills up progressively, and, in the hermaphroditic segments, its size increases up to 112 µm in diameter. Vitelline glands, ovary and uterus form reticulate structures common for the whole strobila. Uterus reticulate appears in the region with well developed female glands, visible well in lateral fields of the strobila, where the ovary does not reach (Fig. 2b). From the mature uterus escape egg packets which contain from several up to 30 eggs. They are frequently fragmented into smaller packets composed of 10–15 eggs. The diameter of packets riches up to 365 µm. Single eggs have a spherical form. The size of the external envelopes of the oncospheres varies between 75–90 x 63–70 µm. Oncospheres are oval, 33–35 x 21–24 µm in diameter. Embryonal hooks measure about 12–13 µm. Internal envelope of oncosphere shows two curved polar processes (Fig. 4).

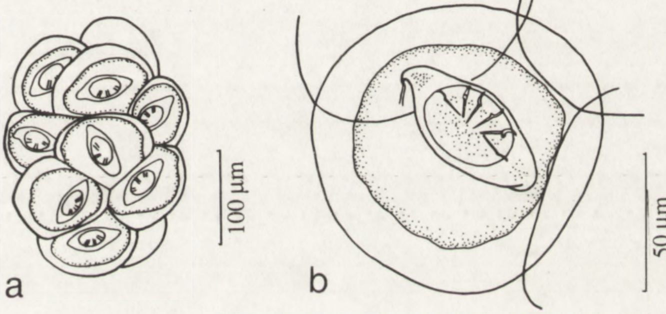


Fig. 4. Eggs of *F. sarcinalis*: a – the packet of eggs, b – one egg from packet in high magnification.

DISCUSSION

The three above mentioned, previously known species of the genus *Fimbriaria* and a new species described in this paper have common characters, expressed in: 1) the shape of strobila (presence of pseudoscolex and lack of proglottids), 2) shape and size of rostellar hooks, 3) arrangement of internal structures (female genital organs of reticulate type, armed cirrus).

The most evident features of *Fimbriaria sarcinalis*, never noticed in any of the up to date known species of the Fimbriaria genus, is the presence of egg packets. In *Fimbriaria amurensis* and *F. kubanica* the eggs leave the uterus separately and their envelopes have a spherical or oval shape (Ko-

telnikov 1960, 1965). Eggs of *F. fasciolaris* are cylindrical in shape and are arranged longitudinally into characteristic chains (Jarecka 1961, Chomicz and Czubaj 1991).

Because Copepods are known as intermediate hosts of other *Fimbriaria* species (Jarecka 1961, Kotelnikov 1960, 1965), in order to complete experimentally the life-cycle of *Fimbriaria sarcinalis*, the cyclops were used as potential intermediate hosts.

Experimental infection repeated three times gave negative results. It is probable, that the eggs of *F. sarcinalis* forming large packets are to big for ingestion by the copepods used in our experiments.

Packets of eggs occur also in other hymenolepidids, for example in the genera *Aploparaksis* and *Microsthomacanthus*, the intermediate hosts of which are Oligochaeta and Amphipoda (Jarecka 1961, Bondarenko 1975, Tolkaćeva 1975). It can not be excluded that the egg packets of *Fimbriaria sarcinalis* in natural conditions are swallowed by other invertebrates, larger than Copepoda.

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